

We claim:

1. A vaccine for the immunization of vertebrates against disease caused by a pathogen, wherein said vaccine comprises an attenuated or avirulent derivative of said pathogen that over-expresses at least one homologous antigens encoded by at least one gene from said pathogen and wherein said at least one antigen is capable of inducing a protective immune response against the pathogen.
2. The vaccine of claim 1, wherein said attenuated or avirulent derivative of said pathogen further expresses one or more heterologous antigens.
3. The vaccine of claim 1, wherein the pathogen is selected from the group consisting of *Brucella*, *Mycobacterium*, and *Vibrio*.
4. A vaccine for prophylaxis or treatment of a vertebrate against Brucellosis, wherein said vaccine comprises an attenuated or avirulent pathogen of *Brucella*, wherein the attenuated or avirulent pathogen over-expresses at least one homologous antigen encoded by at least one gene from said pathogen, and wherein the at least one antigen is capable of inducing a protective immune response in the vertebrate against Brucellosis.

5. The vaccine of claim 4, wherein the pathogen is selected from the group consisting of *B. abortus*, *B. melitensis*, *B. suis*, and *B. canis*.

6. The vaccine of claim 4, wherein *Brucella* is *B. abortus* strain RB51.

7. The vaccine of claim 6, wherein the at least one gene is a Cu/Zn SOD gene.

8. The vaccine of claim 7, wherein the Cu/Zn gene is obtained from a pUC19 genomic library of *B. abortus* strain 2308.

9. The vaccine of claim 6, wherein the at least one gene is one or both of a GroES gene and a GroEL gene.

10. The vaccine of claim 9, wherein the GroES gene and the GroEL gene are obtained from a pUC19 genomic library of *B. abortus* strain 2308.

11. The vaccine of claim 4, wherein the vertebrate is bovine.

12. An attenuated or avirulent version of *B. abortus* strain RB51 that over-expresses at least one homologous antigen capable of stimulating protective immunity against Brucellosis.

13. The attenuated or avirulent version of *B. abortus* strain RB51 of claim 12, wherein the at least one homologous antigen is encoded by at least one gene selected from the group consisting of a Cu/Zn SOD gene,
5 a GroES gene and a GroEL gene.

14. A method for prophylaxis or treatment of a vertebrate at risk of or suffering from a pathogenic micro-organism comprising administering an effective amount of an over-expressing homologous antigen vaccine,
10 wherein said vaccine is an attenuated or avirulent version of said pathogenic micro-organism that over-expresses at least one homologous antigen of the pathogenic micro-organism.

15. The method of claim 14, wherein the vaccine
15 further expresses a heterologous antigen.

16. The method of claim 14, wherein the pathogenic micro-organism is *Mycobacterium* or *Vibrio*.

17. The method of claim 16, wherein the vertebrate is human.

20 18. A method for prophylaxis or treatment of a vertebrate at risk of or suffering from Brucellosis comprising administering an effective amount of a vaccine, wherein said vaccine is an attenuated or avirulent pathogen of *Brucella* that over-expresses at

least one homologous antigen encoded by at least one gene from said attenuated or avirulent pathogen.

19. The method of claim 18, wherein said attenuated or avirulent pathogen further expresses an
5 heterologous antigen.

20. The method of claim 18, wherein the at least one gene is a Cu/Zn SOD gene in *B. abortus* strain RB51.

21. The method of claim 20, wherein the Cu/Zn gene is obtained from a pUC19 genomic library of *B. abortus*
10 strain 2308.

22. The method of claim 18, wherein the at least one gene is one or both of a GroES gene and a GroEL gene in *B. abortus* strain RB51.

23. The method of claim 22, wherein the GroES gene
15 and the GroEL gene are obtained from a pUC19 genomic library of *B. abortus* strain 2308.

24. A method for prophylaxis or treatment of a vertebrate at risk of or suffering from a pathogenic micro-organism comprising the steps of:

20 a) extracting deoxyribonucleic acid from the pathogenic micro-organism;

b) identifying at least one gene encoding at least one antigen from the deoxyribonucleic acid, wherein said

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1 at least one antigen is capable of stimulating protective immunity against the pathogenic micro-organism;

5 c) inserting the at least one gene into a multicopy plasmid capable of replicating and expressing in the pathogenic micro-organism;

d) transforming an attenuated or avirulent version of the pathogenic micro-organism with the plasmid to form a vaccine; and

10 e) administering an effective amount of said vaccine to the vertebrate.

25. The method of claim 24, wherein said attenuated or avirulent version of the pathogenic micro-organism further expresses one or more heterologous
15 antigens.

26. The method of claim 24, wherein the pathogenic micro-organism is selected from the group consisting of *Brucella*, *Mycobacterium*, and *Vibrio*.

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20 27. The method of claim 26, wherein the pathogenic micro-organism is selected from the group consisting of *B. abortus*, *B. melitensis*, *B. suis*, *B. ovis*, *B. neotomae* and *B. canis*.

28. The method of claim 27 wherein the pathogenic
25 micro-organism is *B. abortus* strain RB51.

29. The method of claim 28, wherein the at least one gene is a Cu/Zn SOD gene.

30. The method of claim 28, wherein the at least one gene is one or both of a GroES gene and a GroEL
5 gene.

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